CLAIMS

1. A backup power system comprising:

A) a line breaker switch which is adapted to be electrically interposed between a main power source and a load, said line breaker switch having a closed condition which electrically connects the main power source to the load and an open condition which disconnects the load from the main power source;

B) a generator breaker switch which is electrically connected to the main power source in parallel with the load, said generator breaker switch having a closed condition and an open condition;

C) a generator/condenser unit electrically connected to the main power source via said generator breaker switch to receive power when said line breaker switch is in the closed condition, said generator/condenser unit having a main power source driven condition, a thermal engine driven condition and a flywheel driven condition;

D) a first drive shaft connected at one end thereof to said generator/condenser unit;

E) an overrunning clutch connected to said first drive shaft at a second end of said first drive shaft;

F) a thermal engine having an engine drive shaft connected via said overrunning clutch to said generator/condenser unit to drive said generator/condenser unit via said overrunning clutch when said thermal engine is activated;

G) a second drive shaft connected at a first end thereof to said generator/condenser unit, said second drive shaft being rotatably driven by said generator/condenser unit when said

generator/condenser unit is in the main power source driven condition and when said generator/condenser unit is in the thermal engine driven condition;

H) an input eddy current clutch, said input eddy clutch including a first shaft and a second shaft;

I) a flywheel assembly connected to the first shaft of said input eddy current clutch;

J) a shaft coupling unit connecting said flywheel assembly via said input eddy current clutch to said generator/condenser unit via said second drive shaft, said shaft coupling unit including

(1) a base having a flywheel side face, a generator/condenser side face, and a diametric dimension, the base being fixedly mounted on said second drive shaft for rotation therewith,

(2) two stop pins mounted on the base on the flywheel side face, the stop pins being spaced apart from each other in the direction of the diametric dimension of the base and extending away from a plane containing the flywheel side face of the base,

(3) a toothed gear fixedly mounted on the generator/condenser side face of the base,

(4) a slip plate fixedly mounted on the second shaft of said input eddy current clutch, said slip plate including

(a) a flywheel side face,

(b) a generator/condenser side face,

(c) a diametric axis,

(d) two elongate slots defined through the slip plate, the elongate slots being spaced apart from each other in the

direction of the diametric axis of the slip plate, each elongate slot having a first end and a second end which is spaced apart from the first end, each elongate slot being sized and located to slidingly accommodate a stop pin of the two stop pins mounted on the base, said generator/ condenser unit being slidingly associated with said flywheel unit via said input eddy current clutch when the slip plate is mounted on the stop pins on the base;

K) said shaft coupling unit moving between a source power driven configuration, a thermal engine driven configuration, a transition configuration and a flywheel driven configuration, with each stop pin of the stop pins engaging the first end of a slot accommodating the each stop pin when said shaft coupling unit is in the main power source driven configuration and in the thermal engine driven configuration, and each stop pin of the two stop pins engaging the second end the slot accommodating each stop pin when said shaft coupling unit is in the flywheel driven configuration, and both stop pins being spaced apart from both the first end and the second end of the slot accommodating the stop pin when said shaft coupling unit is in the transition configuration;

L) a gear tooth sensor located adjacent to the toothed gear on said shift coupling unit, said gear tooth sensor including a circuit which generates signals associated with a rate of rotational speed of said second shaft;

M) a gear speed sensing circuit electrically connected to said gear tooth sensor and receiving signals therefrom;

N) an input eddy current clutch speed sensing excitation unit electrically connected to said gear speed sensing circuit and to said input eddy current clutch, said eddy current speed sensing excitation unit including a rotational speed sensor associated with said input eddy current clutch;

O) a comparator circuit which compares rotational speed of said input eddy current clutch as sensed by the rotational speed sensor associated with said input eddy current clutch to rotational speed of said second shaft as sensed by said gear speed sensing circuit, said comparator circuit generating an activation signal when the rotational speed of said second drive shaft as sensed by said gear speed sensing circuit differs from the rotational speed of said input eddy current clutch as sensed by the rotational speed sensor associated with said input eddy current clutch by a pre-set margin, said line breaker switch being opened upon receiving the activation signal from the comparator circuit;

P) a thermal engine controller connected to said thermal engine to activate and de-activate said thermal engine, said thermal engine being activated when said thermal engine controller receives the activation signal from said comparator circuit;

Q) said eddy current speed sensing excitation unit and said gear speed sensing circuit being electrically connected together and to said line breaker switch and to said thermal engine controller, to activate said thermal engine via said thermal engine controller when the speed of said input eddy current clutch as sensed by said eddy current clutch speed sensor and the

speed of said second drive shaft as sensed by said gear speed sensing circuit differ by a preset amount; and

R) the speed of said eddy current clutch being the same as the speed of said second drive shaft when said generator/condenser unit is in the main power source driven condition and in the thermal engine driven condition and the shaft coupling unit is in the main power source driven condition and in the thermal engine driven condition, and the speed of said eddy current clutch being different from the speed of said second drive shaft when said generator/condenser unit is in the transition condition and the shaft coupling unit is in the transition condition.

2. The backup power system defined in Claim 1 further including a second toothed gear on the slip plate, a second gear tooth sensor located adjacent to the second toothed gear, said second gear tooth sensor including a circuit which generates signals associated with the rate of rotational speed of said second gear, said second gear tooth sensor being electrically connected to said comparator circuit of said input eddy current clutch speed sensing excitation unit.

3. The backup power system defined in Claim 1 wherein the stop pins of said shaft coupling unit are removably mounted on the base of said shaft coupling unit.

4. A backup power system comprising:

A) a generator/condenser unit which is adapted to be connected in

parallel with a load which is electrically connected to a main power source;

B) a thermal engine having a controller, said thermal engine being connected to said generator/condenser unit to drive said generator/condenser unit when said thermal engine is activated;

C) a flywheel unit, said flywheel unit including a flywheel;

D) a coupling unit coupling said flywheel unit to said generator/condenser unit, said coupling unit including

(1) a base having a flywheel side face, a generator/condenser side face, and a diametric dimension, the base being connected to said generator/condenser unit,

(2) two stop pins mounted on the base on the flywheel side face when in a use condition, the stop pins being spaced apart from each other in the direction of the diametric dimension of the base and extending away from a plane containing the flywheel side face of the base when in the use condition, and

(3) a slip plate connected to said flywheel unit, said slip plate including

(a) a flywheel side face,

(b) a generator/condenser side face,

(c) a diametric axis,

(d) two elongate slots defined through the slip plate, the elongate slots being spaced apart from each other in the direction of the diametric axis of the slip plate, each elongate slot having a first end and a second end which is spaced apart from the first end, each elongate slot being sized and located to slidingly accommodate a stop pin of the two stop pins mounted on

the base, said generator/ condenser being slidingly associated with said flywheel unit when the slip plate is mounted on the stop pins on the base;

E) said shaft coupling unit moving between a source power driven configuration, a thermal engine driven configuration, a transition configuration and a flywheel driven configuration, with each stop pin of the stop pins engaging the first end of a slot accommodating the each stop pin when said shaft coupling unit is in the source power driven configuration and in the thermal engine driven configuration, and each stop pin of the two stop pins engaging the second end a slot accommodating each stop pin when said shaft coupling unit is in the flywheel driven configuration, and both stop pins being spaced apart from both the first end and the second end of the slot accommodating the stop pin when said shaft coupling unit is in the transition configuration;

F) a shaft speed sensor located adjacent to said shift coupling unit, said shaft speed sensor including a circuit which generates signals associated with a rate of rotational speed of said second shaft;

G) a shaft speed sensing circuit electrically connected to said shaft speed sensor and receiving signals therefrom;

H) a flywheel speed sensing unit electrically connected to said shaft speed sensing circuit and to the flywheel of said flywheel unit, said flywheel speed sensing unit including a rotational speed sensor associated with the flywheel of said flywheel unit;

I) a comparator circuit which compares rotational speed of the

flywheel of said flywheel unit as sensed by said flywheel speed sensing circuit to rotational speed of said second shaft as sensed by said shaft speed sensing circuit, said comparator circuit generating an activation signal when the rotational speed of said second drive shaft as sensed by said shaft speed sensing circuit differs from the rotational speed of the flywheel of said flywheel unit as sensed by the flywheel speed sensing circuit by a pre-set margin;

I) said flywheel sensing circuit and said shaft speed sensing circuit being electrically connected together and to said thermal engine controller, to activate said thermal engine via said thermal engine controller when the speed of the flywheel of said flywheel unit and the speed of said second drive shaft as sensed by said shaft speed sensing circuit differ by a preset amount; and

J) the speed of the flywheel of said flywheel unit being the same as the speed of said second drive shaft when said generator/condenser unit is in the main power source driven condition and in the thermal engine driven condition and the shaft coupling unit is in the main power source driven condition and in the thermal engine driven condition, and the speed of the flywheel of said flywheel unit being different from the speed of said second drive shaft when said generator/condenser unit is in the transition condition and the shaft coupling unit is in the transition condition.

5. A backup power system comprising:

A) a coupling unit which includes

(1) a base having a first side face, a second side face, and a diametric dimension,

(2) two stop pins which are mounted on the base on the first side face when in a use configuration, the stop pins being spaced apart from each other in the direction of the diametric dimension of the base and extending away from a plane containing the first side face of the base when in the use configuration,

(3) a slip plate which includes

(a) a first side face,

(b) a second side face,

(c) a diametric axis,

(d) two elongate slots defined through the slip plate, the elongate slots being spaced apart from each other in the direction of the diametric axis of the slip plate, each elongate slot having a first end and a second end which is spaced apart from the first end, each elongate slot being sized and located to slidingly accommodate a stop pin of the two stop pins mounted on the base;

B) a backup power source connected to base of said coupling unit; and

C) a flywheel unit connected to the slip plate of said coupling unit.